having a lower voltage level than a low level of the gate signal, where the first inverter transistor transmits the first voltage to the second node during a period during which the carry signal is output; and a second inverter transistor connected to a second voltage having a same voltage level as the low level of the gate signals, where the second inverter transistor is turned off during a period other than the period during which the carry signal is output. In such an embodiment, the second input signal and the fourth input signal have an enable level during different periods from each other.

[0030] According to exemplary embodiments, a gate driving circuit may have high reliability.

[0031] According to exemplary embodiments, a display device may have improved image display quality.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] The above and other features of the invention will become more apparent by describing in further detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

[0033] FIG. **1** is a top plan view of a display device according to an exemplary embodiment;

[0034] FIG. **2** is an equivalent circuit diagram of an exemplary embodiment of a pixel of FIG. **1**;

[0035] FIG. **3** is a cross-sectional view of an exemplary embodiment of a pixel of FIG. **1**;

[0036] FIG. **4** is a block diagram of a gate driving circuit according to an exemplary embodiment;

[0037] FIG. **5** is a circuit diagram of an exemplary embodiment of a driving stage of FIG. **4**;

[0038] FIG. **6** is a cross-sectional view of an exemplary embodiment of a first control transistor shown in FIG. **5**;

[0039] FIG. **7** shows a threshold voltage change according to a compensation signal voltage level supplied to a back gate electrode of the first control transistor shown in FIG. **6**;

[0040] FIG. **8** is a timing diagram of signals of the display device according to an exemplary embodiment;

[0041] FIG. **9** is a circuit diagram of an alternative exemplary embodiment of the driving stage of FIG. **4**;

[0042] FIG. **10** is a circuit diagram of another alternative exemplary embodiment of the driving stage of FIG. **4**;

[0043] FIG. **11** is a circuit diagram of another alternative exemplary embodiment of the driving stage v;

[0044] FIG. **12** is a circuit diagram of another alternative exemplary embodiment of the driving stage of FIG. **4**;

[0045] FIG. **13** is a circuit diagram of another alternative exemplary embodiment of the driving stage of FIG. **4**;

[0046] FIG. **14** is a block diagram of a gate driving circuit according to an alternative exemplary embodiment;

[0047] FIG. **15** is a circuit diagram of an exemplary embodiment of a driving stage of FIG. **14**;

[0048] FIG. **16** is a timing diagram of signals of a display device according to an alternative exemplary embodiment; and

[0049] FIG. **17** is a circuit diagram of an alternative exemplary embodiment of the driving stage of FIG. **14**.

DETAILED DESCRIPTION

[0050] The invention now will be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments are shown. This invention may, however, be embodied in many different forms, and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like reference numerals refer to like elements throughout.

[0051] It will be understood that when an element is referred to as being "on" another element, it can be directly on the other element or intervening elements may be therebetween. In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present.

[0052] It will be understood that, although the terms "first," "second," "third" etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, "a first element," "component," "region," "layer" or "section" discussed below could be termed a second element, component, region, layer or section without departing from the teachings herein.

[0053] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms, including "at least one," unless the content clearly indicates otherwise. "Or" means "and/or." As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" when used in this specification, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.

[0054] Furthermore, relative terms, such as "lower" or "bottom" and "upper" or "top," may be used herein to describe one element's relationship to another element as illustrated in the Figures. It will be understood that relative terms are intended to encompass different orientations of the device in addition to the orientation depicted in the Figures. For example, if the device in one of the figures is turned over, elements described as being on the "lower" side of other elements would then be oriented on "upper" sides of the other elements. The exemplary term "lower," can therefore, encompasses both an orientation of "lower" and "upper," depending on the particular orientation of the figure. Similarly, if the device in one of the figures is turned over, elements described as "below" or "beneath" other elements would then be oriented "above" the other elements. The exemplary terms "below" or "beneath" can, therefore, encompass both an orientation of above and below.

[0055] About" or "approximately" as used herein is inclusive of the stated value and means within an acceptable range of deviation for the particular value as determined by one of ordinary skill in the art, considering the measurement in question and the error associated with measurement of the particular quantity (i.e., the limitations of the measurement system).

[0056] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the